

## **Distributed Resources**

### **Electric Policy Committee of the Illinois Commerce Commission Commissioner Terry S. Harvill, Chair**

#### **Comments of Unicom Corporation**

Unicom Corporation (“Unicom”) appreciates the opportunity to provide comments to the Electric Policy Committee (“Committee”) concerning distributed resources. Unicom is the parent company of Commonwealth Edison Company (“ComEd”), a large electric utility, and Unicom Distributed Energy (“UDE”). UDE is a business unit within Unicom Energy Services, Inc., and is the exclusive distributor within a 12-state Midwest region of the Allied-Signal microturbine. We are thus able to provide this Committee with a perspective on distributed resources that few other entities can.

The Committee’s questions are all directed towards “distributed resources.” Distributed Resources is a potentially broad concept encompassing distributed generation, as well as energy storage devices, targeted DSM techniques and energy efficiency products. DSM and energy efficiency products have been the subject of much discussion in the past before the Illinois Commerce Commission (“ICC” or “Commission”). Therefore, we will limit our comments to distributed generation.

Distributed generation is not new. ComEd has a long history of working with those of its customers that are interested in on-site generation to ensure that such generators could be installed and connected to the ComEd system economically, safely and reliably. ComEd supported the installation of on-site generation for those customers for whom it was economic to do so, and offered incentives to other customers to defer or displace uneconomic generation. Almost 100 large customers currently operate onsite-generating units within ComEd’s territory. These units produce over 450 MW of power.

More recently, smaller generators have become more economic to operate. For example, the microturbine that UDE markets is 75 kW. Currently, there are five microturbines operating within the ComEd system. UDE plans to install one or two more units at customer sites within the ComEd system this year, and an additional 200-300 units next year. We believe that there are, or soon will be, more microturbines installed on the ComEd system than anywhere else in the world.

To facilitate the interconnection of distributed generation to the ComEd system, ComEd has developed a set of guidelines. These guidelines are contained in a document called “Guidelines for Interconnection of Generation to the ComEd System.” These Guidelines are readily available to customers and distributed generation developers alike. ComEd has also developed a much simpler and smaller document that highlights the particular guidelines that are applicable for the installation of small generators (<25kVA). This document is called “ComEd’s Interconnection Guidelines for Photovoltaic Power

Systems.” This latter document is currently being revised to encompass a broader range of power systems.

UDE has acquired much experience operating under the ComEd guidelines. In UDE’s view, the Guidelines are comprehensive and provide customers all the information that is needed to facilitate the interconnection process. Perhaps most importantly, the guidelines are substantively quite reasonable both technically and economically.

UDE has also been actively working with utilities out of state to develop reasonable interconnection practices and to install microturbines at customer sites on those utilities’ systems. UDE has installed, or is in the process of installing, 2 microturbines in Ohio, 5 units in Wisconsin, 1 unit in Nebraska and 2 units in Indiana. UDE plans to install an additional 400 units at sites outside of Illinois next year.

The market is working. The key to making this market work has been education. Distributed generation can be interconnected to a utility’s system so as to not only maintain, but to also enhance reliability. UDE is working with other utilities to assist them in understanding the distributed generation industry. Most utilities have been very receptive to UDE’s efforts.

The electric services market is heading in the direction of increased customer choice. Customers have long had choice for energy services provided on their side of the meter. Open access has recently provided customers with choice in their electric supplier. Distributed generation can provide the customer with additional choice by enhancing or displacing local distribution. This choice will complete the conversion of the utility “ratepayer” into a true energy services “customer” with competitive options for all of its electric service needs.

We commend the Commission for beginning the discussion of distributed generation and its role in the electricity market in Illinois. As we note, education is the key for the development of this market. Unicom stands ready to share its experience and to assist the Commission in any way it can in this education process.

However, the use of other mechanisms, such as rulemakings or regulatory proceedings, can only inhibit the development of this market at this stage. Any marketing entity, including a utility, needs flexibility to respond to the technical requirements of a rapidly evolving distributed generation industry. The cost associated with complying with outdated or inappropriate rules, or the uncertainty and delay of obtaining regulatory approval for changes in rules could kill many potential projects. Rulemakings or other regulatory mechanisms should be considered only in the event of demonstrated market failure.

Unicom is also pleased to respond to the specific questions posed by the ICC.

1. **Please provide an exact definition of a distributed resource (DR). For example, is a distributed resource only small-scale generation? If so, of what size? Should DSM services also be included in the definition?**

We have discussed above how broadly distributed resources could be defined, and the reasons why the Commission's inquiry should be limited to a discussion of distributed generation. Unicom believes that the most relevant definition of distributed generation for purposes of the questions posed by the ICC is "electricity production at or near the point of use that operates in parallel with the utility's distribution system."

Several points are evident from this definition. First, distributed generation is not limited to small-scale generation and there is no necessary limit on its size. Secondly, generation that is designed to operate solely for emergency purposes and independently of the utility's grid is excluded from the definition. Such generation does not raise the same issues as generation that is to be operated in parallel with the utility's system.

Third, merchant plants and IPP's are also excluded from the definition. Such plants are designed and built, at least in part, to provide power to the wholesale marketplace and require access to the transmission grid to serve these customers.

- **How can DR be used either in conjunction with traditional utility service or as a stand-alone service to meet customers' demands?**

Either the customer or the utility can use distributed generation in conjunction with traditional utility service. The customer will typically use the distributed generation in two fashions. The primary use for distributed generation is to supply power to a single customer during peak periods. At this stage of technological development, distributed generation is really not economic for use during off-peak hours, except for those customers that are able to make efficient use of a distributed generator's thermal energy.

A secondary use for distributed generation by a customer is standby power. Many types of distributed generation have the ability to operate independently of the grid. This ability increases the economics and value of a distributed generator to a customer. However, due to their higher initial costs, microturbines and other types of distributed generation are probably not economic for most customers when used solely for standby purposes.

More traditional forms of onsite-generation, such as diesel engines, can be economic solely for standby purposes for individual customers. However, as we noted above, most types of emergency generation should not be considered to be distributed generation since they are not operated in parallel with the distribution system.

Distributed generation could also be utilized by the utility in conjunction with traditional utility service. One method for doing so is demonstrated in a Madison Gas and Electric program. This tariffed service provides diesel-fired emergency generation for the customer and a load management resource for the utility. The distributed

generation is owned and operated by the utility for emergency purposes for the individual customer. It is also dispatchable by the utility based upon system needs. This program has resulted in 20 MW of distributed generation, and has allowed for cost recovery by the utility.

- **Can DR be effective in providing loading relief for transmission and distribution systems?**

Yes, distributed generation can be effective in providing load relief for the distribution system provided a reliable technology is used. The Madison Gas program has demonstrated this in the context of distributed generation owned by the utility. Another example is an internet-based remote dispatch and control technology that is currently under development. Once this technology is operational, it will permit a utility to determine that a distributed generator, such as a microturbine, owned by a customer remains available for use by the utility. This technology will also permit the utility to remotely dispatch the customer-owned generator for system needs.

ComEd is currently working on several programs to test what technologies can prove to be reliable sources of power and can also provide loading relief. These programs are being conducted in association with The Center for Neighborhood Technology and the Environmental Law and Policy Center.

- **Should DR be considered when planning for and expanding the T&D system?**

It may be possible for distributed generation to have an impact on the utility's distribution planning, but benefits will not occur in all instances. To the extent that distributed generation reliably provides tangible benefits, the utility may incorporate such benefits into its planning process.

- **What new technologies can be used in conjunction with DR to lower costs and improve service?**

As discussed above, the new internet technology that will allow a utility to remotely control and dispatch customer-owned distributed generation appears promising. In addition, new microprocessor technology has improved control systems making protection of the power delivery systems and the customers connected to it more dependable and effective at the same cost or less.

- **Are there any other benefits from DR (e.g., environmental)?**

Other than the major benefit of affording enhanced choice for customers, two potential benefits from distributed generation are economics (i.e. a lower cost source of on-peak power) and enhanced outage protection. There are also environmental benefits associated with distributed generation. Because the generation is located at or near the point of use, distributed generation eliminates some line losses that result from the

transmission and distribution of electricity. This means that less electricity per distributed generation owner needs to be generated from fossil plants or other sources. Some forms of distributed generation are useful for their thermal output and can be operated for uses as diverse as providing hot water and heated air for 24-hour showers at truck stops or for the recovery of methane gas from landfills. The use of a microturbine for such purposes once again means less energy that needs to be generated from other sources.

The use of renewable energy technologies as distributed generation offers the promise of even greater environmental benefits. Examples of these technologies include windmills, photovoltaics and agricultural and landfill methane recovery systems. As noted above, ComEd is working with the Center for Neighborhood Technology and the Environmental Law and Policy Center to test such technology in the ComEd system.

- **What are the drawbacks of DR (e.g., utility operations, public health and safety, etc.)?**

ComEd has worked very closely and cooperatively with onsite-generation owners to develop comprehensive guidelines that eliminate, or at least minimize, any drawbacks to use of the most common existing forms of distributed generation. As the new, smaller forms of distributed generation become more widely used throughout the market, a similarly close working relationship will be required, and is indeed developing, to minimize any drawbacks to the use of these types of distributed generation. Some of the issues that distributed generator owners, vendors and utilities will need to work together on can be grouped into four areas:

- Effect of distributed generation during short circuits on the line
- Effect of distributed generation on operation
- Distributed generation and unplanned islanding
- Siting

Effect of distributed generation during short circuits on the line – Short circuits on the distribution line caused, for example, by a wire coming into contact with the ground, a tree or even wildlife, result in power flowing from the distributed generator to the short circuit. This unanticipated and unplanned flow of energy can potentially damage wires, fuses and transformers on the distribution system. In order to protect the distribution system, equipment may have to be upgraded or additional equipment installed. This is often a costly undertaking. It can also raise cost recovery issues since the upgrade may not be necessary until after multiple distributed generators have been added to a distribution feeder. The first few customers to have installed distributed generators may not feel obligated to contribute to the cost recovery.

Effect of distributed generation on operations – The distribution system is designed to automatically attempt to reclose after opening for a short circuit. This practice reduces the length of many electrical outages since many outages are caused by a line momentarily coming into contact with another object such as a tree or wildlife. Nevertheless, when these outages occur, the distribution system will go out of sync with any distributed generation connected to that feeder. Reclosing the circuit cannot be performed without potentially causing serious damage to any distributed generation connected to the system. To prevent reclosing, additional equipment must be installed at the source substation to monitor the overhead feeder for the presence of distributed generation.

Caution is also needed during manual operations in the field. During an outage, the utility will attempt to reroute power around the site of the outage by connecting the affected feeder to a different point on the distribution system. However, if distributed generation is connected to the feeder, the utility repair crews can be placed at risk from backfeed from the distribution generation as they work on power lines they presume are deenergized. This situation can be remedied by installing equipment to detect distributed generation on the line or else to lock it out during outage situations.

Distributed generation and unplanned islanding – An outage on the distribution system stops the flow of power from the utility to the load served by the distribution feeder affected by the outage. The presence of distributed generation on that feeder results in power flowing from that generator to all load served on the affected feeder. This is a situation known as islanding. Since the current from the distributed generator is not nearly as strong as the current from the utility, there may be power quality concerns. Low voltage and flicker problems for customers served by that feeder may result if a distributed generator is the source of energy for a greater amount of load than it was designed to serve.

Siting - In addition, there are the usual issues associated with the siting of power plants, e.g. noise, air quality, safety, etc. These issues will, of course, increase with the size of the distributed generation being installed. The Commission need only note the current public outcry surrounding the efforts by some IPP's to build new plants in ComEd's service territory.

- **Please include examples of currently deployed distributed resources either in Illinois or other jurisdictions and explain exactly what services (or value) these resources provide. (If providing examples of distributed resources outside of Illinois, please indicate any unique features of the regulatory or legal environments of that jurisdiction that differentiate it from Illinois as it pertains to distributed resources.)**

We have discussed above the extent to which both ComEd's customers and UDE have installed, and have plans to install, distributed generation both in Illinois and in surrounding states. The primary services or value that these customers can receive from distributed generation are 1) greater choice (more decision power over their lives); 2) a

competitive source of power; 3) a source of standby power in the event of an outage on the utility's system; and 4) thermal energy. Once the internet-based remote dispatching technology is developed, distributed generation will provide additional value to both the local utility and to the customer.

The regulatory and legal environments of the other jurisdictions in which UDE has installed microturbines are not uniquely different from that in Illinois in any manner significant to the deployment of distributed generation. The successful deployment of distributed generation in other jurisdictions has depended not on the more or less favorable rules and regulatory requirements of those other jurisdictions, but on the degree of sophistication of the local utility and the regulatory agency's willingness to allow the market to work. Once the utility understands the technology and how it can be safely and reliably interconnected to that utility's system, UDE has met with very good success in actually deploying its microturbine in a variety of jurisdictions without the need for regulatory intervention. The marketplace works.

**2. What is the market penetration for distributed resources in Illinois (include self-generation and co-gen if not included in your definition provided in question 1)?**

As we noted above, almost 100 customers in ComEd's territory own or operate onsite self-generation or cogens. This accounts for over 450 MW of power. UDE has installed five 75 kW microturbines at customer sites in the ComEd territory, and has plans to install an additional 200-300 such units on customer sites in ComEd's territory next year.

**3. What should the Commission's role, if any, be in promoting this market? If the Commission should have a role, please provide an outline of actions the Commission can take along with a timetable.**

This market for distributed generation is working well and has worked well for years. ComEd has facilitated the growth of this market through its comprehensive interconnection guidelines. New technologies are now entering the market. As their actions in marketing distributed generation and in supporting the interconnection of this technology to the electric grid show, both ComEd and UDE are committed to the continuing development and expansion of the market for distributed generation.

The Commission has two important roles to play in permitting the marketplace to work. The Commission's primary role is exemplified by this request for comments. Increasing awareness and understanding of distributed generation technology, as well as assisting in the education of the market participants is the single greatest contribution this Commission can make to the development of this market. The Commission can facilitate this educational process through meetings of the Electric Policy Committee and seminars that permit entities such as the Center for Neighborhood Technology, Environmental Law and Policy Center, ComEd, UDE and other distributed generation manufacturers to share their experience with other utilities, customers and vendors.

The second role that the Commission can play is that of gatekeeper by minimizing any efforts to leverage the regulatory process to obtain market advantage. This market has developed through the cooperative exchange of information and ideas among utility, vendor and customer. The continuing development of this market requires a partnership among these players built on trust. Nothing can be more destructive of this trust than the initiation of contentious and adversarial rulemakings and regulatory proceedings. The Commission, as gatekeeper, can prevent such proceedings from being initiated, and can direct the parties back into the more productive, educational and market-oriented environment discussed above.

- **How does the manner in which the Commission has unbundled delivery services from generation services impact the cost-effective application of distributed resources?**

Open access potentially provides greater options for the use of distributed generation. Customers can now aggregate their load in order to receive power from a Retail Electric Supplier (“RES”) that owns a distributed generator. Such options may now make distributed generation economic for certain customers where it was not economic before open access.

Open access also provides distributed generation owners with the opportunity to obtain standby power from the competitive market. The customer takes such standby power only on a very intermittent basis. Where distributed generation is installed behind the customer’s meter and the customer obtains standby power from a competitive supplier, the utility must nevertheless build and maintain a complete distribution system required to serve that customer’s maximum demand. The current design of ComEd’s Rate RCDS – Retail Customer Delivery Service – Nonresidential does not provide for adequate compensation for the intermittent delivery of standby power. Thus, the Commission should be willing to consider rate structures designed to permit appropriate cost recovery for the utility, while also providing a cost-effective source of standby power for the distributed generation owner.

- **What aspects of current delivery service rate design should be altered to facilitate the cost-effective deployment of distributed resources?**

As discussed above, an appropriate tariff structure for the delivery of standby power is needed.

- **Should delivery service rates be geographically differentiated to provide the appropriate price signals to locate distributed resources in areas that need distribution upgrades?**

If the market for distributed generation is to develop in an economically efficient and rational manner, conceivably some mechanism designed to send marketplace price signals might be appropriate. Such mechanisms could include the implementation of distribution credits or the establishment of distributed generation development zones. For

example, ComEd's Rider 19 (which expired April 1, 1999) employed the concept of "Energy Renewal Zones." Both mechanisms would require the utility to identify high-cost areas within which distributed generation vendors could be encouraged to target customers. The utility could provide incentives such as distribution credits, financial assistance or any of a variety of other approaches to customers within the identified areas that chose to install distributed resources. Such mechanisms should, of course, not be implemented without the full cooperation of the local utility.

However, drawing geographic boundaries and charging different rates to customers on different sides of the boundary is always controversial. There are always difficult issues concerning how to define geographical areas, e.g. zip code, suburb, region, etc., in a manner that matches the design of the utility's electrical system. No matter where the line is drawn it will always appear unfair to those customers just on the other side of the dividing line who are paying higher charges.

Besides being controversial from a political perspective, any attempt to geographically differentiate delivery service rates will also prove to be extremely challenging from a technical perspective. At this time, there does not exist sufficient underlying data and analysis for a utility to geographically differentiate its delivery service rates in a simple manner that could be easily administered by the utility. Any attempt to gather such data and make such analysis would be extremely difficult and expensive with no significant result. The bottom line is that the use of geographically differentiated rates will not encourage this market to respond appropriately in the cooperative manner that is needed.

- **Should the Commission develop a common set of interconnection rules/tariffs for the state?**

No. This market is developing well through the cooperation of vendors, utilities and customers. The process is one of education, understanding and the mutual exchange of ideas and information. The initiation of a rulemaking or regulatory proceeding that could become adversarial or contentious would be counterproductive. Such proceedings freeze parties in their positions as they advocate for a ruling most favorable to their position; turn partners into adversaries; chill creativity and the adoption of win-win solutions; and frequently result in fishing expeditions as parties seek through discovery to uncover the marketing plans of their competitors. The decisions resulting from such proceedings are often the result of political compromise that bears little relation to the operational and technical concerns of the parties affected. Thus, the decisions become difficult and costly to implement as an entire cottage industry develops devoted to interpreting and applying the rules.

Regulatory rules and tariffs are also inflexible. This is a developing market with rapidly changing technology. The time and expense associated with changing the rules or the tariffs to accommodate the new technology will delay and may even prevent that technology from entering the market.

Any rules this Commission should decide to adopt would, of course, not be binding on the Commission of any other state. Complying with different interconnection requirements in a multitude of states will deny the industry some of the economies of scale and scope associated with a uniform interconnection procedure.

A marketplace solution to this problem is already well underway. IEEE is developing a set of national interconnection guidelines. These guidelines are being developed with the input and cooperation of all marketplace participants. Once completed, these guidelines will provide a better solution than state-adopted rules. They will be national in scope; they will have widespread support; and they will be more amenable to being amended to support new technologies. Illinois should support this effort and allow the market to develop relatively free of artificial constraints.

- **What other changes in legislation, rules, tariffs, unbundling policies and interconnection practices are needed to facilitate the deployment of cost-effective distributed resources?**

None.

**4. What are the requirements in terms of metering, metering standards, data control and management, communications and utility operations for the central dispatch of distributed resources? (Please provide a summary of the assumptions made concerning the distributed resource technology, the structure of the electricity market and the nature of the distribution system used to formulate your answer.)**

Distributed generation must be connected to the utility's system in order to be centrally dispatched. ComEd's current interconnection requirements are contained in two documents, "Guidelines for the Interconnection of Generation to the ComEd System," and "ComEd's Interconnection Guidelines for Photovoltaic Power Systems." A copy of these documents was supplied to the staff this summer in response to their questions concerning distributed generation. Since these documents are not available in electronic format, additional hard copies will be forwarded to Carl Peterson under separate cover.

Additional equipment would be required in order to centrally dispatch the distributed generation. As mentioned above, one promising new technology is an internet-based remote monitoring and dispatch system.

**5. What aspects of past distribution planning and deployment hinder the development of the distributed resources market? Are there specific areas on any utility's system that are particularly problematic for distributed resources? What actions can the Commission take to alleviate any perceived problems?**

Customer owned generation has been in existence for a number of years and utility systems have been designed and built in recognition of this form of distributed generation. However, distributed generation that can provide an economic source of power for customers with relatively small electric loads or that can provide a substitute

for portions of the distribution system is a relatively new technology. The advent of these new, smaller forms of distributed generation will require a new manner of thinking about distribution planning.

Certain areas of the distribution system are more problematic for the installation of distributed generation. These areas are detailed below.

**Low Voltage Spot and Grid Networks:** Low voltage spot and grid network systems have been designed to provide highly reliable 120V or 480V power to specific, concentrated loads. Such systems are typically located in areas of high load density, such as downtown metropolitan areas and large shopping malls. These unique systems contain two or more uniquely designed dedicated transformers that operate with self contained “network protectors” and integrated controls. Because of the integrated aspect of this low voltage distribution subsystem design, the application of paralleled distributed generation into these subsystems is difficult, requiring detailed engineering analysis by both the utility and the distributed generation developer. Without this engineering review and the installation of the proper protective devices, the network can be stressed to the point of failure. The installation of these protective devices may be expensive and can raise cost recovery issues.

**Distribution Automation:** Utilities frequently have distribution automation systems in place to maintain a reliable power delivery system. Distribution automation often takes action, i.e. opening or closing switches, based on the presence of electric current on a line. Distributed generation can adversely effect the operation of these systems by pumping current onto a line from a source that the distribution automation system was not designed to anticipate. While potentially costly, this problem can be mitigated or reduced through the close cooperation of the vendor, customer and utility.

The gas utility’s distribution system can also be problematic for the efficient deployment of distributed generation. Certain portions of the gas distribution infrastructure are inadequate to support distributed generation. There simply is not enough throughput capacity in certain portions of the system. This phenomenon appears to occur more frequently in older parts of the system that are in need of an upgrade.

Many of these potential problems can be alleviated by upgrading the distribution system or installing new technology. However, utilities will be constrained in their ability to implement such actions unless they can be provided a reasonable opportunity to recover all of their distribution system costs. In future utility rate cases, the Commission can alleviate this potential problem by ensuring that the utilities are provided a reasonable opportunity to recover the full costs of their distribution assets.

The Commission should also work with the gas utilities to reveal the portions of their systems that are in need of upgrade or are otherwise inadequate to support distributed generation. This would save distributed generation vendors the costs of stumbling upon these areas after having spent considerable time and effort working with customers to install distributed generation. Again, education will help the market work.

**6. Do the incentives currently inherent in the regulation of the incumbent electric utilities hinder or facilitate the cost-effective application of distributed resources by alternative suppliers? Please explain. If the current structure hinders efficient deployment, what changes are needed?**

There is no better way to respond to this question than to let the market speak for itself. The market is working and is working well. Distributed generation is being installed at customer sites in ever increasing quantities.

The one factor that could operate to hinder the cost-effective application of distributed generation is a refusal by the Commission to allow the utilities to recover all of their distribution-related costs. The Commission needs to permit full cost recovery for the utility. Once a baseline distribution revenue requirement providing for full cost recovery is in place for a utility, there are other actions the Commission can take to ensure that a utility's cost recovery is not adversely affected by the widespread deployment of distributed resources. These include approval of rate designs that provide appropriate opportunity for the utility to recover the base line revenue requirement.

**7. Does the incumbent utility have any market power associated with planning, leasing or dispatching distributed resources? Is this any different from central station generation? Can that market power be mitigated?**

No. The generation market is highly competitive. Thus, there is no market power to be mitigated.

**8. What other issues or problems arise from the incumbent utility owning, operating and deploying distributed resources?**

None. So long as the incumbent utility applies its interconnection guidelines in a nondiscriminatory manner, the competitive distributed generation market will continue to function well.

**9. How is the natural gas industry impacted by distributed resources? Is there a need for changes in the rules, practices, tariffs or market structure to facilitate the cost-effective application of distributed resources?**

The natural gas industry could be very favorably impacted. Distributed generation increases natural gas sales and levels out the gas utility's seasonal load by increasing its summer sales. As we discussed above, the gas utilities could facilitate the deployment of distributed generation by making readily available information concerning the portions of their systems that can support increased distributed generation.

**10. How does the deployment of distributed resources impact competition for the delivery of power and energy?**

The deployment of the more widely discussed forms of distributed resources, e.g. microturbines, photovoltaics, etc., provides additional new choices for customers in energy supply and delivery.

**11. Please provide any additional comments (you may include procedures for the Commission to address any issues that are of concern.)**

Let the market develop. Do not try to regulate competition.